A Radical Journal of Geography
ANTIPODE

Vegetative States: Potatoes, Affordances, and Survival Ecologies

David Nally

Department of Geography, University of Cambridge, Cambridge, UK;
dpn24@cam.ac.uk

Gerry Kearns

Department of Geography, Maynooth University, Maynooth, Co. Kildare, Ireland;
gerry.kearns@nuim.ie

Abstract: The potato has been critical to plant–human assemblages both in South America and in Europe. A study of the capacities, or affordances of this plant within diverse political economies highlights its mutability in some circumstances and vulnerability in others. The contrasts are stark. In South America, peasant agriculture took the potato across a large and diverse ecumene allowing its elaboration into many varieties and sustaining extensive state systems that taxed its production. Spanish colonialism repurposed the plant as the calorific basis for concentrations of coerced labour at silver mines. Back in Europe it was initially the resistance of the potato to state violence that encouraged peasants to turn over their fields to a tuberous plant that "concealed" its food underground. But its calorific productivity per acre again saw it repurposed as peasants were converted to proletarians, allowed to subsist on only the smallest plots while working for landlords on larger estates.

Achoimre: Tá an práta tar éis a bheith riachtanach i gcluichreáin daonna is planda i Meiriceá Theas agus san Eoraip. Tarraingíonn staidéar ar achmhainní agus dus an phlanda seo, in eacnamaíochtaí polaitiúla éagsúla, áird ar inathraitheacht an phráta i gcásanna áirithe agus ar a soghontacht i gcásanna eile. Is géar an chodarsnacht idir an dá chás. I Meiriceá Theas, scaip talamhaíocht tuathánach an práta thar ecumene fairsing ilghnéitheach agus d'fhás an iomaí saghasanna éagsúla práta dá réir, comh maith le córas stáit fairsing a ghearr cáin ar a shaothrú. Thug an coileánachas Spáinneach úsáid úr don phlanda mar bhia chalrach d'oibrithe comhéignithe 'sna mianaigh airgid. San Eoraip thug an práta deis do lucht na tuaithe cur in aghaidh foréigean an stáit mar go raibh maitheas an phlanda i bhfolach faoi thalamh. Ach de bharr fiúntais chalrach in aghaidh an acra an phlanda, cuireadh chun úsáid nua arís é agus lucht tuaithe tiontaithe ina prólaitáireacht nach raibh cead acu ach beart talún bídeach agus iad ag obair ar thailte móra an tiarna talún.

Keywords: affordances, colonialism, famine, Ireland, political ecology, potatoes

> Many historical events, hitherto explained solely in terms of human enterprise, were actually biotic interactions between people and land. (Aldo Leopold 1949, *A Sand County Almanac and Sketches Here and There*)

> [N]ature is not a surface of materiality upon which human history is inscribed; rather history is the process wherein both people and their environments are continually bringing each other into being. (Tim Ingold 2000, *The Perception of the Environment: Essays on Livelihood, Dwelling, and Skill*)

Antipode Vol. 52 No. 5 2020 ISSN 0066-4812, pp. 1373–1392 doi: 10.1111/anti.12652

Colliding Worlds

"Whenever human beings encounter plants", writes Michael Marder (2013:8) in his provocative study, *Plant-Thinking: A Philosophy for A Vegetal Life*, "two or more worlds (and temporalities) intersect". Marder's philosophy of encounter invites us to consider the range and reach of human-plant entanglements taking in, on the one hand, a human world shaped by social norms, economic structures, cultural styles and political dogmas; and, on the other hand, a plant kingdom characterised by metabolic processes, growth cycles, propagation traits, and complex environmental interactions. As "domestication", geographers too have long studied how humans influence plant capacities by altering ecologies and imposing selective breeding (Sauer 1965), but less attention has been paid to how plant capacities in turn animate social and economic possibilities.[1] More broadly, we may ask what sort of socio-spatial formations (Thrift 1996) are made in the mutual constitution of plant and human worlds?

In this paper we explore the problem of interspecies encounter through the concept of *affordances*. The neologism was coined by the psychologist James J. Gibson (1979) to describe the range of actions made possible by the relationship between a person and a given object. The concept highlights "agential intra-activity" (Barad 2003), or "codevelopment" (Tsing 2015), while also focusing upon the properties, or potentialities, of objects as vital preconditions for action (Bennett 2004; Harman 2018; Richardson and Weszkalnys 2014). Affordances can be used to analyse the kinds of transactions that a particular object permits or enables (Greeno 1994:340). Equally, one can explore the kinds of relations that an object thwarts or constrains—what cannot, or is unlikely to happen, in an object's shadow. For Anna Tsing (2015:125), objects, in her case mushrooms, generate "relational force", an idea that resonates with the notion of affordances insofar as it acknowledges the "lively", world-making capacity of objects. Deploying these theoretical approaches, we can ask: How can objects—in our case, the potato plant—stimulate or foreclose various kinds of social action? How are they involved in making and un-making worlds (Van Dooren 2007)?

Peasants and Proletarians

In an "age of biology" (Rose 2013) many have grown accustomed to thinking that the traits of plants are malleable and Richard Mabey (2016:5) even calls plants a "biological proletariat, working solely for the benefit of our species". But outside this narrow utilitarian calculus plants grow and evolve, expressing an agency all of their own (Kohn 2013; Molinier et al. 2006; Wohlleben 2017). Indeed, without "vegetal agency" (Bakke 2018) human life would be impossible (Gibson 2018). Plants act on us as much as we act on them—"no plant: no breath" in Susan Ruddick's (2017:127) succinct formulation.[2] Furthermore, agricultural worlds are complex material formations, connecting all kinds of persons to many kinds of objects. Human needs are a crucial part of this matrix, but any consideration of our "species needs" must pay heed to both human and more-than-human elements (Lorimer 2012). In other words, needs must be "situated" not simply within a recognisably human world of social relations—taking in

human capacities, social preferences, institutional structures, and politically differentiated entitlements (cf. Fraser 1989)—but also in a deeper and richer field of more-than-human partnerships that coproduce life and its possibilities (Barua 2019; Whatmore 2002). We propose to explore affordances within this complex set of inter-dependencies using potato-society assemblages as our prime example.

Potatoes are a New World crop, first domesticated by pre-Columbian Andean peoples and consumed by them in both fresh and processed forms. Together with quinoa and maize, and enlivened by *ají* peppers, beans and local vegetables, the potato was a staple of the Incas' Andean civilisation (Earle 2019a). Once harvested, potatoes are highly perishable, but freezing the tubers (easily accomplished in the frigid altitudes of the Andes) and trammelling them underfoot to expel any remaining moisture, produces a type of "potato flour" known as *chuño* that can be stored for years without spoiling (Messer 2000). The use of this ingenious processing method, along with the construction of purpose-built stone-floor structures to store the harvest (Zimmerer 1993), brought the potato within the orbit of surplus-oriented state activities and ensured the dispersal of varieties throughout the realm. However, according to geographer Karl Zimmerer, it was the potato's primary role as a subsistence food embedded in a complex "mountain ecology" that furnished the tuber with its staggering biological diversity. Over millennia Andean farmers, planted tuber-seeds in high elevation environments—"hidden" or "fugitive locales" that insulated peasants from the over-lord ruled landscapes of the Andean valleys (Zimmerer 2015:190–191). In these "out-of-the-way" vertical habitats, peasants faced unique environmental conditions: dramatic variations in soil, gradient, humidity and precipitation produced intense selection pressures that favoured versatile cultivars with a broad-based adaptive capacity (Ochoa 2001; Wust 2001; Zimmerer et al. 2017). A culture of mutualism and reciprocity, with high rates of seed-tuber exchange, created an additional stimulus for crossings and gene flow, as did the practice of growing cultivated species in fields fringed by the potato's wild tuber-bearing relatives (*Solanum* L. sect. *Petota* Dumort) (Pollan 2002; Spooner and Hetterscheid 2006).

The extraordinary biotic affordances of the Andean world were both mutable and contingent—that is to say, they depended on the "reciprocal interplay" (Ingold 2000:3) between finely balanced social and ecological systems. When the Spanish arrived in the 16th century, they brought with them what Carolyn Merchant (1980) calls a "mechanical philosophy of nature". Andean farmers measured time by how long it took to boil a pot of potatoes, and space (*papacancha*) by the area needed to plant sufficient potatoes to feed one's family (Angé 2020; Glave 2001:51), feats Berry aptly describes as "potato knowing" (2008:170).[3] By contrast the Spanish viewed nature as external, inert and passive—material to be tamed and domesticated through human design and graft. Profit was the measure of utility and the Spanish were quick to simplify and instrumentalise the tuber's vital affordances. Soon freeze-dried *chuño* was being fed to coerced labourers extracting silver and mercury from the bowels of the earth at Potosí and Huancavelica (Salaman 2000:40). According to Canadian historian William McNeill (1999:70), the potato became the "principal fuel" of an Atlantic-world empire; provisioning the "human muscles" that staffed the perilous mines and

freeing "a freshet of silver from the Spanish Empire in the Americas to upset prices and traditional human relationships andcexpectations among all the civilized peoples of the Old World". The flow of surplus to the Spanish colonial state through official levies, forced labour (or *mita*), and integration within the European market system meant that a growing proportion of indigenous production, *including* its "ecological surplus", was absorbed by the members of European society (Moore 2010; Stern 1982). In addition, enterprising Spanish settlers acquired private estates (haciendas) where they raised livestock and cereal crops for the newly arrived Spanish, and potatoes, cacoa, sugar and other products destined for mining towns and markets. Plantation work depended on a ready supply of "abundant and cheap labour" (Spalding 1975:114) and in this way the potato, having been a staple of peasant production and a readily taxable product within the Andean state systems, was repurposed as a food fuelling coerced labour under European colonialism. "No plant; no bullion", to adapt Susan Ruddick's formulation.

The Spanish were also responsible for the introduction of the potato to Europe in the mid 16th century (Hawkes and Francisco-Ortega 1992; Salaman 2000). Inventory records from Gran Canaria describe barrels containing "patata" (the Spanish term for potato) bound for Antwerp and Rouen in 1567 and 1574 respectively (Hawkes and Francisco-Ortega :199390–91).[4] Given the difficulty of potato seed surviving the Atlantic crossing, it is most likely that these potatoes were harvested from tubers successfully grown on the Canary Islands from as early as 1562 (Hawkes and Francisco-Ortega 1992:5). Spanish soldiers, merchants and sailors dispersed the tuber across the continental Europe, although modern scholars disagree on the exact subspecies they handled. Salaman (2000) proposed that the first modern potato introduced to Europe was the *Solanum tuberosum andigenum*, the subspecies that formed tubers in the short-day environments of the Andes (cf. Salaman and Hawkes 1949). According to Salaman it took time for European growers to evolve a long-day adaptation (*Solanum tuberosum* subsp *tuberosum*), but Spooner and Hetterscheid (2006) challenged this hypothesis, suggesting instead that early introductions to Europe were from the Andes and from a second set of Chilean landrace populations related to the *andigenum* subspecies but pre-adapted to the long days of Europe. Whether the European potato derived from single or multiple centres, the salient point is surely that subspecies were acquired by lifting cultivars out of their native production, processing and consumption contexts. Specifically, the spatial co-occurrence of wild and cultivated potato plants, common in South America and central to stimulating gene flow, was entirely absent in Europe, a fate that lessened biodiversity and left the harvest especially vulnerable to blight.

Leaving the vagaries of the potato diffusion to one side: what accounts for the potato's reception? What compelled peasants to dig up their gardens, and later their fields, filling the ground with unfamiliar seed? Two factors seem to bear on the potato's diffusion and reception across Europe: war and land. In a period of intense conflict, the potato's furtive features—its ability to "hide" underground—meant the tubers could evade detection (or if noticed they might still prove too bothersome for marauding armies to root out). Typically, armies ate "on the

hoof", seizing grain stores and commandeering crops to nourish troops and steeds. As war machines ballooned in size—armies grew ten-fold in the 16th century, becoming permanent and professional (Federici 2004:68)—so too did the devastation they wrought. McNeill (1999) considers the Thirty Years War (1618–1648) as the "climax of this destructive process". The war is estimated to have culled two-fifths of the rural and one-third of the urban population of the German lands (Outram 2002:248). McNeill remarks that it "was the last war fought in northern Europe before potatoes became widespread enough to cushion the human cost of military requisitioning by forestalling rural starvation". "In fact", continues McNeill (1999:72), "the value of potatoes in time of war was so enormous that every military campaign on European soil after about 1560 resulted in an increase in potato acreage, down to and including World War II".

McNeill was not the first scholar to call attention to the relationship between warfare and potato diffusion in Europe. Citing an account of 1660 from the border region of Alsace, Vandenbroeke (1971) concluded that conflict shaped dietary choice:

> Since the province was nearly always the first arena of war in Europe the peasants valued a ground-crop [potatoes] that could feed the people, their cows and pigs, and give a good yield. It was never exposed to damage by … the ravages of war, for when an army camped for a month on a field of potatoes, the farmer could still harvest them … when the army left. (Vandenbroeke 1971, quoted in Reader 2009:116)

More recently Rebecca Earle (2019a:58) has argued that the potato's ability to remain stubbornly "resistant to control and appropriation" made the crop ideally suited to subsistence practices, including the "state-evading" techniques that James Scott (2017:268) has drawn attention to in his pioneering work on peasant communities. The suggestion that potatoes afforded protection from predatory practices—enacted by state and non-state actors alike—is one we will take up later with reference to colonial Ireland.

But first we wish to register the importance of land politics to the potato's diffusion. To state the obvious, all soil-based crops are subject to land-based politics. Indeed, this idea was crucial to Karl Marx's (1976:876) theory of capital accumulation: "The expropriation of the agricultural producer, of the peasant, from the soil, is the basis of the whole process [of primitive accumulation]". The demise of the peasant's ability to self-provision heralded the beginning of new forms of market-based exchange. In a similar vein, Karl Polanyi (2001) memorably described land as a "fictitious commodity"; that is, not a commodity at all, but something that is historically "assetised"—recast as an exploitable resource (Li 2014)—even as it forms the material basis for the reproduction of social life.

The potato arrived in Europe during a period of intense and far-reaching social and economic upheaval. The "transition" from an essentially feudal economic order to a capitalist mode of production involved the parcelling out of open-fields, the privatisation of common lands and the abutment of gleaning rights (Messer 2000:191). This process of "enclosure" (McDonagh 2013) prepared the ground, quite literally, for the potato. Prior to enclosure, producers typically enjoyed direct (that is, non-market) access to the means of subsistence (Wood

2003). In an overwhelmingly agrarian society, the seizure of land—its "dis-commoning"—pushed the propertyless into a life of injurious, "sub-subsistence" precarity (Kearns 2014; Linebaugh 2014:53). As peasants became proletarians the potato rose in importance as both a lifeline and an enabler; it allowed workers to survive on the little land left to them and it enabled their social reproduction from extremely meagre resources—an affordance that we term "survival ecology". The vital affordances of this "Enlightenment super-food" have been carefully documented by Rebecca Earle (2018:147). Her research overturns conventional wisdom that "enlightened savants", most famously Antoine-Augustin Parmentier (1737–1813), were responsible for persuading conservative peasants to adopt this strange root from the Andes. On the contrary, Earle (2018) finds abundant evidence to suggest that across Europe peasants were turning to potatoes long before these official acts of gastronomical persuasion. In other words, the potato's adoption was a grassroots affair, borne from a new need to make meagre lands produce as much as possible.

Earle considers the 18th century pivotal to this dietary transition, and indeed in England this coincides with the "high tide" of the parliamentary enclosure movement (Mingay 1997:88). But her findings beg the question of where to position Ireland in this narrative. There, potato adoption was earlier and certainly more extensive than in much of the rest of Europe. Ireland appears exceptional in another sense too. Several scholars have argued that the potato heralded, or rather hastened, a series of grand revolutions—stimulating unprecedented population growth (Langer 1963), a new industrial order (McNeill 1948; Salaman 2000), and mass urbanisation (Nunn and Qian 2011)—and yet in Ireland the potato is forever associated with hardship and hunger on a staggering scale (de Jong 2016). During the famine years (1845–1850) more than one million souls perished and a further two million people emigrated over the ensuing decade (Nally 2011b). In other words, in a short space of time Ireland lost almost one third of its pre-famine population (estimated at 8.5 million). Today the country stands as a "demographic exception": the only European country to have fewer persons living there today than it had 170 years ago. The blight (*phytophthora infestans*) that destroyed Ireland's harvest affected many parts of western Europe, but only in Ireland, and to lesser extent Scotland (Devine 1988), did crop disease trigger starvation on a biblical scale. The crucial question is: Why did the same crop produce in different places such divergent social and ecological pressures? Why such vividly contrasting affordances?

Survival Ecologies

To understand these differences, we need to know more about the "lifeworld" into which the potato was planted. We begin in the second half of 16th century, a mere half century before potatoes were first observed growing in Ireland.

Following Henry VIII's break with Rome, Catholic Ireland was thought to be a strategic threat to the Crown. After a localised Irish rebellion in 1583 Queen Elizabeth saw an opportunity to contain this threat and finally subdue Ireland (Canny 1976). In 1586 she initiated a massive land grab, confiscating close to 400,000 acres in the southern province of Munster. This act of dispossession was swiftly

followed by an equally ambitious project of re-territorialisation: landed estates of between 4000–12,000 acres were awarded to 35 English landlords and some 20,000 settlers who vowed to anglicise the "barbarous Celts". James I continued Elizabeth's policy, known as "plantation", confiscating a further 3.8 million acres in the northern province of Ulster and encouraging English and Scottish settlers to occupy the expropriated estates (Edwards and Hourican 2005). Further land grabs took place after Oliver Cromwell brutally suppressed another Irish rebellion in the 17th century. All told, by the 18th century, Catholic ownership had dwindled to a mere 14% (Smyth 2006:377). On the eve of the Great Famine, 10,000 landlords controlled the entire rental estate of Ireland (Black 1960:5; Hoppen 1999:39). Two centuries of confiscation and plantation had turned a nation of owners into a nation of tenant-paupers.

The forces that enclosed fields and raided common lands across Europe were, in other words, weaponised in Ireland: appropriation became expropriation and market forces became "forced markets" (Keen 1994). Stationed in Ireland during the Munster campaign of 1579–1583, the poet Edmund Spenser recommended a scorched-earth policy, starving the Irish by laying waste to fields and storehouses (Smyth 2006:45). Of this venture, Sir William Pelham wrote, "We passed through the rebel counties in two companies, consuming with fire all habitations and executing the people wherever we found them" (quoted in Salaman 2000:211). Surveying the aftermath Spencer described the people as mere "anatomies of death" feeding on carrion, watercress, shamrocks and grasses. Geographer William Smyth (2006:47) estimates that the population of Munster may have been reduced by as much as one-eighth. The depredation in Munster was repeated in Ulster during the final phase (1600–1603) of the Nine Years' War where the English commander, Mountjoy, decided that his army "could hardly find out any other course to overcome [the Irish] but by famine" (quoted in Carey 2014:472). Thereafter, "his men … systematically cut down standing corn, seized or burnt harvested crops, and butchered or carried off livestock" (Connolly 2007:253–254).

In their Irish expedition of 1649–1653, Cromwell and his New Model Army deployed similar tactics: burning fields, levelling cabins, demolishing mills, slaughtering herds, razing barns. It is clear too that this was a deliberate war-time tactic: a list of "military weapons" from an army storehouse in Waterford included 216 scythes, 40 reaping hooks and whetstones (Ellis 1975:26). The Governor of Dublin, John Hewson, reported that Cromwell's soldiers "doth now intend to make use of scythes and sickles that were sent over in 1649, with which they intend to cut down corn [i.e. grain] growing in these parts" (quoted in Ellis 1975:26). Writing in 1652 Colonel George Cooke, a returned emigrant from New England and then Governor of Wexford, recalled:

> In searching all the woods and bogs we found great store of corn, which we burnt, also all the houses and cabins we could find; in all of which we found plenty of corn: we continued burning and destroying for four days … The enemy in these parts chiefly depended upon this country for provision. I believe we have destroyed as much as would have served some thousands of them until the next harvest. (quoted in Rai 1993:28; cf. Ellis 1975:37)

In 1641 the property of Ireland was valued at two and half million pounds, but within a decade its value had depreciated by one fifth (Salaman 2000:226). Thousands of captured rebels were transported to the West Indies where they became the chief source of white plantation labour (Connolly 2008:381), while more than 10,000 Catholic landowners forfeited their estates under the draconian Commonwealth Acts of 1652 and 1653 (Smyth 2006:161). In short, a new Ireland was being forged as the potato made its first appearance there.

Did these scorched-earth practices play a role in the early adoption of potatoes in Ireland? For Salaman, the fact that that potatoes are "easy to grow and easy to hide" was a decided advantage: "The people were famished. To sow their usual crops was but to invite their destruction. Every seed crop, be it oats or barley, rye or wheat, might be raised in a day; if it escaped that hazard, the garnered harvest might be raided or burnt overnight" (Salaman 2000:215, 223). By contrast, root and tuber crops might represent a form of "escape agriculture", if not "appropriation-proof" (Scott 2009:195), then at least a chance to "outwit the spirit of destruction, and the malevolence of his enemy" (Salaman 2000:215). Reflecting on findings from a cottier settlement in Ashbourne, County Meath, landscape archaeologist William Frazer offers support for this view, arguing that early potato adoption was a "pragmatic" choice for peasant-subalterns in an era of "rampant crop vandalism":

> As a tuber, the potato was significantly less susceptible to crop destruction than a grain staple: it was possibly—considering its relative novelty at the time—less easily recognised by marauders; it could be grown in hand-dug cultivations strips, in inaccessible and "unsurveilled places" (see Frazer 1999)—such as steep river banks—that might help ensure its protection from destruction; it could easily be converted into food even when a local grain mill, for whatever reason, was inaccessible; and—if we imagine that raiders rarely had the time or inclination to actually dig potato fields up—it was still salvageable even in fields that had been put to the torch, after armies had moved on. (Frazer 2007:190)

Frazer's research urges us to rethink "adaptive strategies", involving new human and non-human partnerships, as a prudent response to aggressive forms of primitive accumulation (Frazer 1999:6). Seen this way, potato growing approximates the strategies of evasion and resistance that Scott (1985) terms "weapons of the weak".

It is clear too that other stressors aided this shift toward novel forms of survival ecology. The usurpation and enclosure of Gaelic land was the prelude to the imposition of an entirely new political, social and economic order—what one scholar calls "the world's first structural adjustment programme" (Wood 2017:155). The goal, as historian Jane Ohlmeyer (1998) explains, was to re-make Ireland in the image of south-east England. Penal Laws were drafted to suppress the Catholic faith—Catholics could not vote, hold political office, possess arms, teach school, or own a horse with a value of more than £5. The indigenous legal system, known as "Brehon law", was proscribed and Gaelic traditions, including the Irish language, were vilified and repressed. Significantly the Penal Laws exacerbated land poverty: no Catholic could purchase land or retain a lease for longer

than 31 years. If the eldest son of a Catholic converted to Protestantism, he immediately became owner of his father's estate; if the father was survived by Catholic sons, however, his land was divided equally among them. The power of the newly established "Protestant Ascendancy" rested on plunder and legislative fiat (Nally 2011b).

In the economic sphere, a series of parliamentary acts—most importantly the Navigation, Cattle and Woollen Acts—ensured that Ireland's economic activity was carefully synchronised to ensure England's domestic growth and commercial expansion (Nally 2012). The Navigation Acts, "a rather invisible episode in Irish colonial history" (O'Hearn 2005:8–9), precluded Irish traders from importing high-value colonial products. The Cattle Act of 1665 prohibited the exportation of live cattle to England and encouraged a transition to sheep husbandry and the provisions trade. Barrelled beef, butter, and pork imported from Ireland would feed England's growing base of urban consumers (Cullen 1968) and expanding Atlantic empire (Nash 1985). The Wool Act of 1699 banned the export of Irish wool to any country other than England, providing raw materials for Yorkshire weavers whilst shielding them from European competition. With a few exceptions —notably the linen trade in Ulster—these policies suffocated native industry and locked Ireland into a negative path dependency. By the 19th century all the major Irish towns were seaports, reflecting Ireland's new role as a subordinate supplier of commodities for a rapidly expanding maritime empire (Wood 2003).

Again, it is what was happening in the rural sector that concerns us most. The commercial expansion that followed the Cromwellian conquests hastened what Clifford Geertz (1963) has elsewhere described as "agricultural involution". A new managerial class of landowners served leases that promoted a switch from tillage to pasturage. Graziers, dairy farmers, speculators and middlemen took advantage, scattering the poorest to make way for consolidated sheep-runs and cattle ranches. Where arable farming persisted, rural toilers, restricted by penal laws and proto-industrial collapse, were compelled to accept small plots with the rent to be worked out in labour. Given the immense competition for land—and the necessity of securing subsistence—workers often agreed to the highest possible rents and the lowest possible value on their labour (Rogers 1847a). The self-same pressures that pushed the poor on to ever smaller slips of land encouraged a deepening reliance on a very narrow range of varieties of potato. Indeed, on the eve of the Famine just one variety, the prodigious but blight-prone "Lumper", was the mainstay of the poorest class of farmers (Bourke 1993).[5] For the vast majority of Irish people everyday life had become a virtual "speculation in subsistence" (Miller 1985:53).

Potato Affordances

We now turn back to the lifeworld of the potato. Obviously, these transformations had a fateful impact on existing patterns of living. Faced with land poverty and lacking alternative sources of income, Irish peasants resorted to the much-derided "pig and potato" economy (Elly 1848). The potato, popularly known as the "staff of life", presented unique affordances. Potatoes have a high "environmental

plasticity" (Reader 2009:24); that is, they are "hardy and adaptable" (Walvin 1997:102) and can be grown in most altitudes, soils and climates.[6] In Ireland they thrived on mountainside, bogland, and on other marginal soils, terrain too inhospitable for growing wheat, rye, barley or oats. In fact, so luxuriantly did potatoes grow in Ireland that even a small parcel of land—indeed as little as one acre—could provide enough food for an entire family to subsist (Lloyd 2007:311). On the eve of the potato blight, 1845, more than two million acres were devoted to raising potatoes, and the poorest Irish adults were consuming a staggering 10-15 lbs per person per day (Connell 1962:59; Smee 1847:21).

It is significant too that potatoes yield more calories per acre than does grain; indeed, the potato yield in Ireland was six times greater than that of wheat. In the words of John Reader (2009:22), "potatoes produce more energy per day on a given area than any other crop, and are, therefore, the most efficient means of converting plant, land, water and labour into a nutritious and palatable crop". Potatoes also produce their own seed, a neat biological affordance that makes non-market, subsistence culture possible. It mattered too that potatoes could be fed to livestock or retained for human consumption (Smee 1847:27). Little was wasted and fattened animals—commonly swine, but sometimes cattle, sheep and poultry—could be retained as a hedge against scarcity or sold to meet the landlord's rent. If stored in a dry environment potatoes will also keep longer than most roots and tubers—a fact that explains why they were first considered a mainstay against periodic famine. On the other hand, as Victorian chemist Alfred Smee observed, potatoes lifted straight from the ground can be boiled and eaten with little ceremony, as was common in pre-Famine Ireland. By comparison, to convert wheat into flour or meal one needs "mills, machinery or other preparation" (Smee 1847:138–139) which had to be paid for in cash or in kind.[7] In other words, high levels of potato consumption could be maintained without cash or the complex infrastructures of a market economy. Finally, as we have already discussed, the fact that tubers grow underground—"unseen in occulted darkness" (Gallagher and Greenblatt 2000:113)—offered some protection from plunder and military requisitioning. In short, potatoes were an ideal "poor man's crop": they afforded a living in conditions of rank inequality. We might say that the potato was a lifeline, a form of "salvational nutrition" (Gallagher and Greenblatt 2000:118), at least for a time.

It seems important to stress that while the subsistence sector was extensive, it existed alongside, and crucially *made possible*, larger commercial operations. By the turn of the 19th century, the Irish economy was supplying British cities with 83% of their beef, 79% of their butter, and 86% of their pork (Connolly 2008:360). Throughout the provinces of Leinster and Munster pasturage and tillage relied on cheap labour from the subsistence sector, forming what Mokyr (1983:21) has described as a "patchwork quilt" of very large and very small farms "intertwined and mutually dependent". Grown on great estates, oats were the largest single-item shipped from Ireland, and on the eve of the Great Famine Ireland was exporting grain in quantities sufficient to feed two million people. Evidently, the small potato growers were central to the productivity of the top layer of Irish agriculture, the landed aristocracy. When the intrepid traveller Asenath

Nicholson asked why potatoes were so prevalent in the cabins of Ireland, a local cottier responded, "because the landholder sees we can live and work hard on 'em, he grinds us down in our wages, and then despises us because we are ignorant and ragged" (Nicholson 1927:242).[8] For the Irish poor, potatoes afforded subsistence, whereas for the landed elite they fortified sinew and bone, the corporeal stock dragooned into service to enable profit and accumulation. As the potato crop rose in importance so too did the possession of land, a situation that privileged a small cadre of landowners at the expense of their tenants. The rural masses must have land or starve; landowners, perhaps a third of whom were non-resident "absentees" with estates managed by grasping "middlemen", viewed their tenants as near-inexhaustible fonts for rent.[9] The greed of one met the desperation of the other with the terminable division of land and surge in rents the pitiful outcome. Potatoes, the principal crop raised by farmers, furnished foreign markets with their provisions, middlemen with their rack-rents, and landowners with cheap, abundant labour. Far from occupying different lifeworlds, then, the wretched cottier and the mighty landlord were *bound together* by the material affordances of this migrant vegetable.

Strikingly, early commentators were mostly impressed by the potato's life-supporting qualities. Travelling around Ireland between 1776 and 1779, for example, the distinguished agriculturalist, Arthur Young (1892a:106), described the poorest as living heartily on a "belly full of potatoes" washed down with milk and butter. When potatoes were scarce or out of season, oats were employed to make cake-bread or stir-about; meat was a rarity, reserved mostly for religious holidays (Young 1892a:120, 214). Still, Young was sure that the potato-eating Irish were better fed than their wheat-eating neighbours:

> The food of the common Irish, potatoes and milk, have been produced more than once as an instance of the extreme poverty of the country; but this, I believe, is an opinion embraced with more alacrity than reflection. I have heard it stigmatized as being unhealthy, and not sufficiently nourishing for the support of hard labour; but this opinion is very amazing in a country, many of whose poor people are as athletic in their form, as robust, and as capable of enduring labour as any upon the earth. (Young 1892b:3)

Impressed by the vigour and health of the Irish, Young returned home an arch "potato enthusiast" (Gallagher and Greenblatt 2000:119) known for his tireless campaigns to promote potato growing (Handy 2019). Nor was Young alone in his support for potato cultivation. In *The Wealth of Nations*, Adam Smith contrasted the robustness of the Irish poor with the feeble wheat-supported frames of Britain's urban population (Lloyd 2007:317), while the vocal Scottish physician William Buchan praised potatoes as a vital ingredient in national prosperity (Earle 2019b:14).

However by the 19th century, the potato, formerly celebrated as an agent of improvement, was increasingly looked upon as an enervating esculent and harbinger of moral decline. "Provided they have had sufficient supplies of potatoes", complained British economist John Ramsay McCulloch (1864:322), "[the Irish] have been content to vegetate, for they can hardly be said to live, in rags and

wretchedness". Charles Trevelyan (1848:7–8), the Assistant Secretary to the Treasury, tellingly wrote: "There is scarcely a woman of the peasant class in the west of Ireland, whose culinary art exceeds the boiling of a potato". William Cobbett famously railed against the "villainous root" and decried the "beastly habits"—or toxic affordances—he felt the crop produced and sustained (Dyck 1992:119). In an outstanding example of what Terry Eagleton (1995:16) terms "dietary determinism", potatoes were now depicted as the "root" of Irish evils. The Irish population had climbed from an estimated three million in 1750 to over eight million by 1841, and the potato was singularly blamed for this "prolific" expansion. "Wealth does not accumulate; but men do", declared the physician and surgeon James Johnson (1844:273), "*teste* nine million of population—two million of paupers—and four million of the 'finest pisantry [sic] in the world' living on wet potatoes, with or without salt".[10] Nassau Senior (1868:143) declared that "a labouring population eating meat must be more thinly scattered than one eating corn; and a potato-fed community might be denser than one eating wheat".

Here we see emerge what famine scholar Alex de Waal (2018:27) terms "alimentary economics", an abstract and reductive logic that depicts humans as bare biological beings (Bänziger et al. 2016) with propensities, tastes, values, habits, thoughts and desires that can be surveyed, predicted, quantified, adjusted and managed (Simmons 2015; Spary 2014). Food had long been a marker of difference (Mintz 1986), but increasingly it became a strategic element in the calculation of profit and loss. Whereas a poorly nourished population was prone to idleness and demagogic association, a vigorous well-fed population produced a healthy and industrious workforce, paving the way for national affluence (Earle 2019b; Foucault 2007; Nally 2011a). More than any other figure, Malthus set the terms for this discussion (Lloyd 2007), both in the way that he fixed the health of populations to the vagaries of food supply, but also in the way that he grafted an economy of order onto different modes of provisioning (Dean 2015; Tellmann 2013). As we noted above, one of the reasons why potatoes were adopted by peasants was the fact that they afforded direct, non-market access to food. This very point was noted by several observers. Referring to Ireland, Jasper Rogers (1847b a:7) described potatoes as the "coin of the realm"—that is, the currency that replenished *and* remunerated labour—while Quaker activist Jonathan Pim (1848:124) noted that "[p]otatoes were not merely the food of the people of Ireland, but in many places they supplied the place of capital and of a circulating medium" (cf. Bigelow 2003:127–130; Ó Gráda 1993). Yet the advance of capitalism, as ideology as much as economic structure, cast suspicion on money-less self-provisioning as a way of life. Hitherto a marker of autonomy and independence, "subsistence" was recast as a scandalous and wasteful practice, an affront to the moral obligations of civilised life (Mies and Bennholdt-Thomsen 2009). Thus Malthus read material conditions, and expressly the "potato system", as an expression of a deeper moral failing: "I am also strongly disposed to believe that the indolent and turbulent habits of the lower Irish can never be corrected, while its potatoe [sic] system enables them to increase so much beyond the regular demand for labour" (Malthus 1826:386). Only a grain-fed population—underwritten by a

wage economy that compelled the poor to *earn* their keep—could restrain population growth and place the people on a more secure footing.

Vegetative States

In *Imperial Leather: Race, Gender, and Sexuality in the Colonial Contest*, Anne McClintock suggests that English racism "drew deeply on the notion of the *domestic* barbarism of the Irish as a marker of racial difference". Where skin colour proved "imprecise and inadequate", continues McClintock (1995:53), domestic disorder and public hygiene could be fixed on as "positive signs" of Irish barbarism. McClintock is undoubtedly right to draw attention to the tropes of grime, filth, dirt, and disease that mark the Irish as Other, but civilisational distance was also expressed, or rather produced, through a running commentary on Irish diet (Nally 2008).

Indeed, it seems that few problems were not in some way linked to the rotten affordances of this most overdetermined vegetable. The low productivity of Irish labour was blamed on excessive potato consumption. "An Englishman works better than an Irishman", declared Sandham Elly (1848:10), "[because] an Englishman is strong from nourishing diet". Elly compared the corn-raised American ("well-built, muscular, and hard-working") and the rice-eating Asian ("well formed and hardy") with the potato-phagous Irishman, "undersized, ill-made, without muscle" (Elly 1848:11–12). For Elly, potatoes explained why the Irish countryside was "one unbroken waste of furze, heath, and fern"; why "man and swine feed alike … [and] both meet on equal terms"; and why the Irish, overindulged on "an amatory food", were content to parent "some fifteen or sixteen children" (Ely 1848:7, 14, 24). For Alfred Smee, it was deeply regrettable that potatoes too easily furnished the poor with subsistence:

> [A] nation of potatoe-eaters [sic] does not feel those relations and dependencies which bind other societies together. A man's own labour supplies him with food, and he cares not for nor requires any other man's assistance; hence, many of the social relations are destroyed; the relation between the labourer and the farmer, the miller and the baker, do not exist; and, in the end, each man is in his own person king, magistrate, and subject, not caring for the assistance nor fearing the displeasure of any other human being. (Smee 1847:139)

"The potatoe [sic] plant is a plant of indolence", concluded Smee (1847:143), "and politically injurious to the community when extensively employed". The result in Ireland, he said, was a thoroughly "unsocial condition" that left the poor "caring for nothing but their dish of potatoes" (Smee 1847:139–140).

Again and again commentators painted a picture of social paralysis. The potato—grown on plots revealingly termed "lazy beds"—made and kept Ireland poor and nothing less than a sweeping "social revolution" would free the people from their profligate dependence on this mischievous root. It was in this context that the arrival of potato blight was greeted as blessing in disguise, a "providential act" that would rouse the Irish from their vegetative state and encourage a "transition" from a potato-system of "small holdings, allotments, and subdivision of

land, which now prevails in Ireland, to the better practice of day-labourer for wages, and to that dependence on daily labour for support" (British Parliament 1837:236). Writing for the *Times*, Charles Trevelyan (1847) voiced his approval for the de-cotterisation of Ireland which perforce meant rooting out potato fields: "That the change from an idle, barbarous, isolated potato cultivation, to corn cultivation, which enforces industry, binds together employer and employed in mutually beneficial relations, and requiring capital and skill for its successful prosecution, supposes the existence of a class of substantial yeomanry who have an interest in preserving the good order of society, is proceeding as fast as can reasonably be expected under the circumstances".[11] The medical journalist, John Forbes (1853:236), thought it desirous to render "the people of Ireland ... more attached to cereal food", while writer and tireless purveyor of economic laws, Harriet Martineau, expressed the view that the peasant was not "a safe proprietor at present" and that a "course of discipline" was needed to break the "habits of slovenly cultivation [and] dependences on the potato" (Martineau 1852:216).

In this paper we have explored four very different kinds of potato ecology. Following its "discovery" in the New World it was first a staple of local states before being repurposed under colonialism as a subsistence crop for the coerced labour of the mining economy. In Europe it likewise served diverse purposes, first as a hedge against scarcity and military requisitioning, and only later as a "cheap" provider of the calories that afforded Europe's farmers a modicum of autonomy and independence (Patel and Moore 2018). In Ireland the potato's affordances took on a more sinister character. Hidden underground the tuber initially offered vital protection from the scorched-earth tactics practiced by an expansionary English state, but perhaps even more significant was the potato's ability to furnish independent subsistence as land access diminished and alternative sources of income were foreclosed by legislative sanction. Against all the odds potatoes thrived, and the Irish population expanded—developments that were praised, at least initially, because they enabled the super-exploitation of the poor. In this respect the affordances of the potato were recognised even as they splintered holdings and promoted a tedious and unvaried diet. It is only later in the 18th and 19th century that we observe a shift in discursive emphasis, with the potatoes and potato-eaters now associated with moral turpitude and lax habits. The emphasis on the moral aspects of diet was concomitant with the rise of classical liberalism and the increasing dominance of market values in social life. Market values devalorised and degraded what Scott (1976) has termed the "subsistence ethic"—namely a community's ability to reproduce their own life unmediated by exchange and commodity forms. The potato, by keeping the people locked in a vegetative state and deferring the expansion of agrarian capitalism, was now considered an obstacle to profit, productivity, competition and unremitting accumulation. In the end, famine dispatched the cottier class and the smallholder potato-system, at a cost in misery and mortality seared as trauma into the Irish psyche, yet broadly acceptable to the contemporary British ruling class.

"Seeing a plant", says Richard Mabey (2016:11), "is a matter of scale and relevance". This paper has tried to place large-scale human drives—to annex territory and to siphon surplus—in the context of biotic interactions that sometimes hinder

and at other times abet those aims. Alerting us to the varying purposes plants serve in different settings, affordances provides a useful way to think about such human-plant assemblages, and ultimately to see how an ordinary plant played an extraordinary role in the making and resisting of empires.

Acknowledgements

We would like to thank Inanna Hamati-Ataya for the original stimulus to think about the lively capacities of objects as well as an opportunity to verbally present some of the ideas in the paper. Thank you also to Olivia Angé, Ed Kiely, Jim Duncan, Chris Otter, Fearghus Ó Conchúir, Jim Scott, Willie Smyth and three anonymous reviewers for their encouragement and critique.

Endnotes

[1] Sauer's (1966) account of Spanish colonialism in the Caribbean is a pioneering example.

[2] The UBC-based forest ecologist Suzanne Simard explains how trees send and receive messages, transmitting information about drought and other abiotic stresses, shaping the behaviour of neighbouring trees that receive these vital dispatches. And of course, plants express agency insofar as they release oxygen, provide food, fuel, shelter and shade—actions that are instantly recognisable to humans because they impact us directly (cf. Jones and Cloke 2002; Wohlleben 2017).

[3] In assisting in the cultivation of the potato, the Andean farmer was also engaging in the reproduction of Andean culture. "This is why", as Luis Miguel Glave writes (2001:48), "the history of Andean culture is also the history of the potato".

[4] One of the challenges for Salaman, Hawkes and Francisco-Ortega was discerning whether the archives referred to *Solanum tuberosum* or sweet potatoes, *Ipomoea batatas*. The Spanish word for potatoes, "patata" clearly derives from "batata" making errors in identification rather easy. However, as Hawkes and Francisco-Ortega (1993) note, early Spanish records almost always distinguish between the "patata" and "batata". Furthermore, the records in the Canary Islands use the South American word "papa" alongside the Spanish word "patata"—a coincidence not found in other Spanish records—confirming that these early inventories refer to the *Solanum* potato.

[5] The prodigious variety of potatoes was and remains a gift of the long history of cultivation in South America. This allowed Irish farmers to select those that were most productive per acre under local conditions. This had its own dangers of course and agronomists returned to the South American cornucopia after the Famine to source types that proved more resistant to blight.

[6] The reputation of the potato is still well-established in popular culture. For example, in Ridley Scott's film *The Martian* (2015, 20th Century Fox), botanist Mark Watney, faced with a very challenging environment on Mars, chooses the most nutritious and robust plant known to him: the potato. As Reader (2009) remarks this is a case of art imitating life for the potato is central to NASA's ongoing plans for piloted long-distance space travel.

[7] Indeed, the obligation to use the manorial mill was one of the taxes laid upon medieval serfs (Langdon 2004).

[8] "So long as cottiers could feed themselves on potatoes", comments John Reader (2009:158), "landlords could require them to work more intensively on the production of commodities for export".

[9] The remarks of Anne Plumptre (1817:338) are quite typical: "The true source of the calamities of the country is in the principal landholders absenting themselves from it, spending in foreign climes (for even England is in this respect a *foreign clime*) the fortunes which ought to be participated with the poor, form the *sweat of those brows* they are derived."

[10] "In no country on the face of the globe", Johnson (1844:282) continued, "is emigration more necessary or more beneficial than in Ireland, where the very poverty and idleness of the inhabitants tend annually to swell the streams of a redundant population!"
[11] Elsewhere Trevelyan (1848:195–196) wrote that "it is desirable to teach him [cottiers] the use of a more substantial diet, both to enable him to give a proper amount of labour for hire, and in order to raise him to a higher standard as a social being. We shall not consider the object finally accomplished until the people of Ireland live upon a bread and meat diet, like those of the best parts of England and Scotland".

References

Angé O (2020) Ecological nostalgias and interspecies affect in the Highland potato fields of Cuzco (Peru). In O Angé and D Berliner (eds) *Ecological Nostalgias: Memory, Affects, and Creativity in Times of Ecological Upheavals* (forthcoming). New York: Berghahn

Bakke M (2018) Of plants and robots: Art, architecture, and technoscience for mixed societies. In G Aloi (ed) *Why Look at Plants? The Botanical Emergence in Contemporary Art* (pp 217–220). Leiden: Brill

Bänziger P, Streng M and Suter M (2016) Histories of productivity: An introduction. In P Bänziger and M Suter (eds) *Histories of Productivity: Genealogical Perspectives on the Body and Modern Economy* (pp 1–19). London: Routledge

Barad K (2003) Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs* 28(3):801–831

Barua M (2019) Animating capital: Work, commodities, circulation. *Progress in Human Geography* 43(4):650–669

Bennett J (2004) The force of things: Steps toward an ecology of matter. *Political Theory* 32 (3):347–372

Berry D J (2018) Plants are technologies. In J Agar and J Ward (eds) *Histories of Technology, the Environment, and Modern Britain* (pp 161–185). London: UCL Press

Bigelow G (2003) *Fiction, Famine, and the Rise of Economics in Victorian Britain and Ireland*. Cambridge: Cambridge University Press

Black R D C (1960) *Economic Thought and the Irish Question, 1817–1870*. Cambridge: Cambridge University Press

Bourke A (1993) *"The Visitation of God"? The Potato and the Great Irish Famine*. Dublin: Lilliput Press

British Parliament (1837) "Report of George Nicholls on Poor Laws, Ireland." British Parliamentary Papers 69

Canny N (1976) *The Elizabethan Conquest of Ireland: A Pattern Established*. Sussex: Harvester Press

Carey V (2014) "As lief to the gallows as go to the Irish wars": Human rights and the abuse of the Elizabethan soldier in Ireland, 1600–1603. *History* 99(3):468–486

Connell K H (1962) The potato in Ireland. *Past and Present* 23(1):57–71

Connolly S J (2007) *Contested Island: Ireland, 1460–1630*. Oxford: Oxford University Press

Connolly S J (2008) *Divided Kingdom: Ireland, 1630–1800*. Oxford: Oxford University Press

Cullen L M (1968) *Anglo-Irish Trade, 1660–1800*. Manchester: Manchester University Press

de Jong H (2016) Impact of the potato on society. *American Journal of Potato Research* 93:415–429

de Waal A (2018) *Mass Starvation: The History and the Future of Famine*. Cambridge: Polity

Dean M (2015) The Malthus effect: Population and the liberal government of life. *Economy and Society* 44(1):18–39

Devine T J (1988) *The Great Highland Famine: Hunger, Emigration, and the Scottish Highlands in the 19th Century*. Edinburgh: John Donald

Dyck I (1992) *William Cobbett and Rural Popular Culture*. Cambridge: Cambridge University Press

Eagleton T (1995) *Heathcliff and the Great Hunger: Studies in Irish Culture*. London: Verso

Earle R (2018) Promoting potatoes in 18th century Europe. *Eighteenth-Century Studies* 51 (2):147–162

Earle R (2019a) *Potato*. London: Bloomsbury
Earle R (2019b) Potatoes and the pursuit of happiness. *Gastronomica: The Journal of Critical Food Studies* 19(1):14–32
Edwards R D and Hourican B (2005) *An Atlas of Irish History* (3rd edn). London: Routledge
Ellis P B (1975) *Hell or Connaught! The Cromwellian Colonisation of Ireland, 1652–1660*. Belfast: Blackstaff Press
Elly S (1848) *Potatoes, Pigs, and Politics: The Curse of Ireland and the Cause of England's Embarrassments*. London: Kent and Richards
Federici S (2004) *Caliban and the Witch: Women, the Body, and Primitive Accumulation*. New York: Autonomedia
Forbes J (1853) *Memorandums Made in Ireland in the Autumn of 1852, Volume II*. London: Smith, Elder, and Company
Foucault M (2007) *Security, Territory, Population: Lectures at the Collège de France, 1977–1978* (trans G Burchell). New York: Palgrave Macmillan
Fraser N (1989) *Unruly Practices: Power, Discourse, and Gender in Contemporary Social Theory*. Minneapolis: University of Minnesota Press
Frazer W O (1999) Reconceptualizing resistance in the historical archaeology of the British Isles. *International Journal of Historical Archaeology* 3(1):1–8
Frazer W O (2007) Field of fire: Evidence for wartime conflict in a 17th century cottier settlement in County Meath, Ireland. In T Pollard and I Banks (eds) *Scorched Earth: Studies in the Archaeology of Conflict* (pp 173–196). Leiden: Brill
Gallagher C and Greenblatt S (2000) The potato in the materialist imagination. In C Gallagher and S Greenblatt (eds) *Practising New Historicism* (pp 110–135). Chicago: University of Chicago Press
Geertz C (1963) *Agricultural Involution: The Process of Ecological Change in Indonesia*. Berkeley: University of California Press
Gibson J J (1979) *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin
Gibson P (2018) *The Plant Contract*. Leiden: Brill
Glave L M (2001) The conquest of the highlands. In C Graves (ed) *The Potato Treasure of the Andes: From Agriculture of Culture* (pp 42–51). Lima: International Potato Center
Greeno J G (1994) Gibson's affordances. *Psychological Review* 101(2):336–342
Handy J (2019) "The enchantment of property": Arthur Young, enclosure, and the cottage economy in England, 1770–1840. *Journal of Agrarian Change* 19(4):711–728
Harman G (2018) *Object-Oriented Ontology: A New Theory of Everything*. London: Pelican
Hawkes J G and Francisco-Ortega J (1993) The early history of the potato in Europe. *Euphytica* 70:1–7
Hawkes J G & Francisco-Ortega J (1992) The potato in Spain during the late 16th century. *Economic Botany*, 46(1):86–97
Hoppen K T (1999) *Ireland Since 1800: Conflict and Conformity*. London: Longman
Ingold T (2000) *The Perception of the Environment: Essays on Livelihood, Dwelling, and Skill*. London: Routledge
Johnson J (1844) *A Tour in Ireland with Meditations and Reflections*. London: S. Highley
Jones O and Cloke P (2002) *Tree Cultures: The Place of Trees and Trees in Their Place*. London: Bloomsbury
Kearns G (2014) Governing vitalities and the security state. *Environment and Planning D: Society and Space* 32(5):762–778
Keen D (1994) *The Benefits of Famine: A Political Economy of Famine and Relief in Southwestern Sudan, 1993–1989*. Princeton: Princeton University Press
Kohn E (2013) *How Forests Think: Toward an Anthropology Beyond the Human*. Berkeley: University of California Press
Langdon J (2004) *Mills in the Medieval Economy: England, 1300–1540*. Oxford: Oxford University Press
Langer W L (1963) Europe's initial population explosion. *American Historical Review* 69(1):1–17
Leopold A (1949) *A Sand County Almanac and Sketches Here and There*. Oxford: Oxford University Press

Li T M (2014) What is land? Assembling a resource for global investment. *Transactions of the Institute of British Geographers* 39(4):589–602
Linebaugh P (2014) *Stop, Thief! The Commons, Enclosures, and Resistance*. Oakland: PM Press
Lloyd D (2007) The political economy of the potato. *Nineteenth-Century Contexts* 29(2/3):311–335
Lorimer J (2012) Multinatural geographies for the Anthropocene. *Progress in Human Geography* 36(5):593–612
Mabey R (2016) *The Cabaret of Plants: Botany and the Imagination*. London: Profile
Malthus T R (1826) *An Essay on the Principle of Population: A View of its Past and Present Effects on Human Happiness* (6th edn). London: John Murray
Marder M (2013) *Plant-Thinking: A Philosophy for A Vegetal Life*. New York: Columbia University Press
Martineau H (1852) *Letters from Ireland*. London: John Chapman
Marx K (1976 [1867]) *Capital, Volume 1* (trans B Fowkes). London: Penguin
McClintock A (1995) *Imperial Leather: Race, Gender, and Sexuality in the Colonial Contest*. London: Routledge
McCulloch J R (1864) *The Principles of Political Economy with Some Inquiries Respecting their Application* (5th edn). Edinburgh: Adam and Charles Black
McDonagh B (2013) Making and breaking property: Negotiating enclosure and common rights in 16th century England. *History Workshop Journal* 76(1):32–56
McNeill W H (1948) The introduction of the potato into Ireland. *Journal of Modern History* 21(3):218–222
McNeill W H (1999) How the potato changed the world's history. *Social Research* 66 (1):67–83
Merchant C (1980) *The Death of Nature: Women, Ecology, and the Scientific Revolution*. New York: Harper Row
Messer W (2000) Potato. In K F Kiple (ed) *The Cambridge World History of Food* (pp 187–201). Cambridge: Cambridge University Press
Mies M and Bennholdt-Thomsen V (2009) *The Subsistence Perspective: Beyond the Globalised Economy*. London: Zed Books
Miller K A (1985) *Emigrants and Exiles: Ireland and the Irish Exodus to North America*. Oxford: Oxford University Press
Mingay G E (1997) *Parliamentary Enclosure in England: An Introduction to its Causes, Incidence, and Impact, 1750–1850*. New York: Routledge
Mintz S (1986) *Sweetness and Power: The Place of Sugar in Modern History*. New York: Penguin
Mokyr J (1983) *Why Ireland Starved: A Quantitative and Analytical History of the Irish Economy, 1800–1850*. London: George Allen and Unwin
Molinier J, Ries G, Zipfel C and Hohn B (2006) Transgeneration memory of stress in plants. *Nature* 442(31):1046–1049
Moore J (2010) "This lofty mountain of silver could conquer the whole world": Potosí and the political ecology of underdevelopment, 1545–1800. *Journal of Philosophical Economics* 4(1):58–103
Nally D (2008) "That coming storm": The Irish Poor Law, colonial biopolitics, and the Great Famine. *Annals of the Association of American Geographers* 98(3):714–741
Nally D (2011a) The biopolitics of food provisioning. *Transactions of the Institute of British Geographers* 36(1):37–53
Nally D (2011b) *Human Encumbrances: Political Violence and the Great Irish Famine*. Notre Dame: University of Notre Dame Press
Nally D (2012) The colonial dimensions of the Great Irish Famine. In J Crowley, W J Smyth and M Murphy (eds) *Atlas of the Great Irish Famine* (pp 64–74). Cork: Cork University Press
Nash R C (1985) Irish Atlantic trade in the 17th and 18th centuries. *William and Mary Quarterly* 42(3):329–356

Nicholson A (1927) *The Bible in Ireland ("Ireland's Welcome to the Stranger or Excursions through Ireland in 1844 and 1845 for the Purpose of Personally Investigating the Condition of the Poor")* (edA T Sheppard). New York: John Day
Nunn N and Qian N (2011) The potato's contribution to population and urbanization: Evidence from a historical experiment. *Quarterly Journal of Economics* 126(2):593–650
Ochoa C (2001) Universal gift. In C Graves (ed) *The Potato Treasure of the Andes: From Agriculture of Culture* (pp 122–132). Lima: International Potato Center
Ó Gráda C (1993) *Ireland Before and After the Famine: Explorations in Economic History, 1800–1925* (2nd edn). Manchester: Manchester University Press
O'Hearn D (2005) Ireland in the Atlantic economy. In T McDonough (ed) *Was Ireland a Colony? Economics, Politics, and Culture in 19th Century Ireland* (pp 3–26). Dublin: Irish Academic Press
Ohlmeyer J (1998) "Civilizinge of those rude parts": Colonization within Britain and Ireland, 1580s–1640s. In N Canny (ed) *The Oxford History of the British Empire, Vol. 1: The Origins of Empire—British Overseas Enterprise to the Close of the 17th Century* (pp 124–147). Oxford: Oxford University Press
Outram Q (2002) The demographic impact of Early Modern warfare. *Social Science History* 26(2):245–272
Patel R and Moore J W (2018) *A History of the World in Seven Cheap Things: A Guide to Capitalism, Nature, and the Future of the Planet*. London: Verso
Pim J (1848) *The Conditions and Prospects for Ireland and the Evils Arising from the Present Distribution of Landed Property With Suggestion For a Remedy*. Dublin: Hodges and Smith
Plumptre A (1817) *Narrative of a Residence in Ireland during the Summer of 1814, and that of 1815*. London: Colburn
Polanyi K (2001 [1944]) *The Great Transformation: The Political and Economic Origins of Our Times*. Boston: Beacon
Pollan M (2002) *The Botany of Desire*. New York: Random House
Rai M (1993) Columbus in Ireland. *Race and Class* 34(4):25–34
Reader J (2009) *The Untold History of the Potato*. London: Vintage
Richardson T and Weszkalnys G (2014) Resource materialities. *Anthropological Quarterly* 87 (1):5–30
Rogers J (1847a) *Facts for the Kind-Hearted of England! as to the Wretchedness of the Irish Peasantry, and the Means for Their Regeneration*. London: J Ridgway
Rogers J (1847b) *The Potato Truck System of Ireland: The Main Cause of Her Periodical Famines and of the Non-Payment of Her Rents*. London: J Ridgway
Rose N (2013) The human sciences in a biological age. *Theory, Culture, and Society* 30 (1):3–34
Ruddick S M (2017) Rethinking the subject, reimagining worlds. *Dialogues in Human Geography* 7(2):119–139
Salaman R N (2000 [1949]) *The History and Social Influence of the Potato*. Cambridge: Cambridge University Press
Salaman R N and Hawkes J G (1949) The character of the early European potato. *Proceedings of the Linnean Society of London* 161(1), 71–84
Sauer C O (1965) Cultural factors in plant domestication in the New World. *Euphytica* 14:301–306
Sauer C O (1966) *The Early Spanish Main*. Berkeley: University of California Press
Scott J C (1976) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. New Haven: Yale University Press
Scott J C (1985) *Weapons of the Weak: Everyday Forms of Peasant Resistance*. New Haven: Yale University Press
Scott J C (2017) *Against the Grain: A Deep History of the Earliest States*. New Haven: Yale University Press
Scott J C (2009) The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia. New Haven: Yale
Senior N (1868) *Journals, Conversations, and Essays Relating to Ireland, Vol. I*. London: Longmans Green and Company

Simmons D (2015) *Vital Minimum: Need, Science, and Politics in Modern France*. Chicago: Chicago University Press
Smee A (1847) *The Potato Plant, Its Uses and Properties Together with the Cause of the Present Malady*. New York: Wiley and Putnam
Smyth W J (2006) *Map-Making, Landscapes, and Memory: A Geography of Colonial and Early Modern Ireland c. 1530–1750*. Cork: Cork University Press
Spalding K (1975) Hacienda-village relations in Andean Society to 1830. *Latin American Perspectives* 2(1):107–121
Spary E (2014) *Feeding France: New Sciences of Food, 1750–1815*. Cambridge: Cambridge University Press
Spooner D M and Hetterscheid W L A (2006) Origins, evolution, and group classification of cultivated potatoes. In T J Motley, N Zerega and H Cross (eds) *Darwin's Harvest: New Approaches to the Origins, Evolution, and Conservation of Crops* (pp 285–307). New York: Columbia University Press
Stern S J (1982) *Peru's Indian Peoples and the Challenge of Spanish Conquest*. Madison: University of Wisconsin Press
Tellmann U (2013) Catastrophic populations and the fear of the future: Malthus and the genealogy of liberal economy. *Theory, Culture, and Society* 30(2):135–155
Thrift N (1996) *Spatial Formations*. London: Sage
Trevelyan C E (1847) Distress in Ireland. *The Times* 12 October
Trevelyan C E (1848) *The Irish Crisis*. London: Longman, Brown, Green and Longmans
Tsing A (2015) *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton: Princeton University Press
Van Dooren T (2007) Terminated seed: Death, proprietary kinship, and the production of (bio)wealth. *Science as Culture* 16(1):71–94
Vandenbroeke (1971) Cultivation and consumption of the potato in 17th and 18th century. *Acta Historica Nederlandica* 5:15–39
Walvin J (1997) *Fruits of Empire: Exotic Produce and British Taste, 1660–1800*. London: Macmillan
Whatmore S (2002) *Hybrid Geographies: Natures, Cultures, Spaces*. London: Sage
Wohlleben P (2017) *The Hidden Life of Trees: What They Feel, How They Communicate* (trans J Billinghurst). New York: Harper Collins
Wood E M (2003) *Empire of Capital*. London: Verso
Wood E M (2017) *The Origin of Capitalism: A Longer View*. London: Verso
Wust W (2001) The potato's birthplace. In C Graves (ed) *The Potato Treasure of the Andes: From Agriculture of Culture* (pp 42–51). Lima: International Potato Center
Young A (1892a) *A Tour in Ireland (1776–1779), Vol. I* (ed A W Hutton). London: George Bell and Sons
Young A (1892b) *A Tour in Ireland (1776–1779), Vol. II* (ed A W Hutton). London: George Bell and Sons
Zimmerer K C (1993) Agricultural biodiversity and peasant rights to subsistence in the Central Andes during Inca rule. *Journal of Historical Geography* 19(1):15–32
Zimmerer K C (2015) Understanding agrobiodiversity and the rise of resilience: Analytic category, conceptual boundary object, or meta-level transition? *Resilience* 3(3):183–198
Zimmerer K C, Córdova-Aguilar H, Mata Olmo R, Jiménez Olivencia Y and Vanek S J (2017) Mountain ecology, remoteness, and the rise of agrobiodiversity: Tracing the geographic spaces of human–environment knowledge. *Annals of the American Association of Geographers* 107(2):441–455